ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

February 15, 2018

SUBJECT: **U. S. Steel –Clairton Plant**
400 State Street
Clairton, PA 15025-1855

Allegheny County

Installation Permit: No. 0052-I011a

TO: JoAnn Truchan, PE
Section Chief, Engineering

FROM: Hafeez Ajenifuja
Air Quality Engineer

FACILITY DESCRIPTION:

U. S. Steel Mon Valley Works Clairton Plant is the largest by-products coke plant in North America. The Clairton Plant operates 10 coke batteries and produces approximately 13,000 tons of coke per day from the destructive distillation (carbonization) of more than 18,000 tons of coal. During the carbonization process, approximately 225 million cubic feet of coke oven gas are produced. The volatile products of coal contained in the coke oven gas are recovered in the by-products plant. In addition to the coke oven gas, daily production of these by-products include 145,000 gallons of crude coal tar, 55,000 gallons of light oil, 35 tons of elemental sulfur, and 50 tons of anhydrous ammonia. The coke produced is used in the blast furnace operations in the production of molten iron for steel making.

AMENDMENT DESCRIPTION:

This permit is for the amendment of the U. S. Steel Mon Valley Works Clairton Plant installation permit (0052-I011), which was issued in July 24, 2008, pursuant to Article XXI, §2103.14.b. This amendment is. for the following changes:

1) Section I: Revised the responsible official and facility contact information;
2) Conditions IV.26.f.2 & 3: Removed the conditions. The conditions were removed because the consent order and agreements have been terminated and have no legal effect;
3) Condition IV.26.f.2: Added new condition. This is a new consent order, which was signed in March 2016 and superseded prior agreements that were deleted;
4) Condition IV.27: The condition was moved from Section V;
5) Condition V.A.1.gg, Table 1: Revised the emissions table based on 2013 stack testing. The criteria pollutant emissions during the installation permit process in 2008 was based on different emission

factor, partly on AP-42 but the current limit is based on recent C-battery stack test;

6) V.A.1.gg, Table 1-A: Added a separate SO_2 emissions table based on SIP IP-0052-I017;
7) Condition V.A.2.s: Added condition on how to determine and comply with SO_2 emissions by converting the H_2S grain loading of the fuel burned and the fuel flow rate;
8) Condition V.A.2.r: Removed the SO_2 emission stack testing requirement. This was removed because the facility will estimate the SO_2 emissions based on the H_2S grain loading of the fuel burned and fuel flow rate/throughput;
9) Condition V.A.2.t: Removed the NOx emission stack testing and retain the CEM testing requirement. The facility has installed NOx CEM on the combustion stack and will use the CEM data to estimate and comply with NOx emissions;
10) Condition V.A.3.a: Added the monitoring condition to monitor the H_2S grain loading in the fuel burned;
11) Section VII: Revised the emission summary table and removed the sentence "this section is provided for informational purposes.

The rest of the permit conditions remain unchanged.

Netting/PSD Analysis for the C Battery Amendment:

The emission calculations presented in Table 1 below provide the combustion stack emissions before and after the amendment. Table 2 shows the summary of emission calculatuions of both C battery and shutdown batteries 7-9. Table 3 shows the PSD analysis resulting from the increases associated with the operation of C Battery and the emission decreases resulting from the shutdown of Batteries 7, 8 & 9.

The increase in pollutant emissions due to the operation of C Battery and the emissions decreases due to the shutdown of Batteries 7, 8 & 9 result in a net emissions decrease. The summary of the netting analysis presented in Table 3 indicates a net reduction in emissions of all PSD and Nonattainment New Source Review pollutants; therefore, this amendment project will net out of PSD and Nonattainment New Source Review.

Table 1

Table 1 - C Battery Combustion Stack Emission Limitations

POLLUTANT	Before Amendment	After Amendment
	TPY [1]	TPY [1]
Particulate Matter	17.30	77.0
PM-10	16.90	75.4
PM-2.5	16.70	74.5
Nitrogen Oxides	461.20	609.80
Carbon Monoxide	351.7	438.98
Sulfur Oxides	91.9	140.30
Volatile Organic Compound	5.0	51.9
Total Reduced Sulfur	0.007	8.80
Benzene	0.18	4.38
HCl	9.82	22.0
Naphthalene	0.50	0.50

[1]A year is defined as any 12 consecutive months.

Table 2- Summary of Emission Calculations

Table C1 - 2 Summary of Emission Calculations

	Actual Annual Emissions for BATTERIES 7-9							Future Allowable Emissions for BATTERY C						
PROCESS	NO_x	SO_2	VOC	PM TOTAL (filt+cond)	PM_{10} TOTAL (filt+cond)	$PM_{2.5}$ TOTAL (filt+cond)	CO	NO_x	SO_2	VOC	PM TOTAL (filt+cond)	PM_{10} TOTAL (filt+cond)	$PM_{2.5}$ TOTAL (filt+cond)	CO
	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year	tons/year
Pre-Push Emissions	0.176	0.623	0.113	11.949	6.174	5.775	0.140	0.006	0.023	0.001	12.869	6.649	6.220	0.004
WITHOUT HOOD														
Pushing Fugitives	0.2	1.3	1.0	5.9	3.2	2.0	0.8	0.2	0.8	0.6	3.6	2.0	1.2	0.5
WITH HOOD														
PEC BH	13.5	50.5	3.1	15.2	7.2	3.5	33.9	15.9	37.9	1.2	33.5	14.9	6.1	38.2
Traveling	10.9	40.6		23.2	8.7	3.2	8.7	6.4	24.1		13.8	5.2	1.9	5.2
PEC fugitives	1.7	6.4	29.8	172.0	95.3	59.1	23.0	0.9	3.5	20.4	119.1	65.8	40.7	16.2
Quenching			35.5	367.1	297.0	226.9			21.9	43.9	108.3	105.5	102.8	
STACK TOTAL (from Stacks_20	1035.0	102.4	6.7	95.8	91.2	89.5	418.0	609.8	140.3	51.9	77.0	75.4	74.5	439.0
Ball Mill				0.015	0.015	0.015					0.017	0.017	0.017	
Soaking	0.6	60.9	3.7	9.2				0.3	34.1	2.1	5.2			
Decarbonization							715.6							691.8
Fugitives														
Doors			6.8	5.5			3.4			2.6	2.2			1.3
Lids			0.0	0.01			0.01			0.1	0.1			0.04
Charging			0.4	0.4			0.2			0.5	0.4			0.2
Offtakes			0.2	0.2			0.1			0.1	0.1			0.1
TOTAL	1062.2	262.7	87.3	706.4	508.9	390.0	1203.8	633.6	262.6	123.4	376.1	275.5	233.5	1192.5

Table 3
PSD and Nonattainment New Source Review Applicability Analysis

Pollutant	C Battery Emission Increases	Battery 7, 8 & 9 Emission Decreases	Net Emission Change	PSD Significant Threshold	PSD Applicability	NA NSR Significant Threshold	NA NSR Applicability
	tons/yr	tons/yr	tons/yr	tons/yr		tons/yr	
NO_X	633.6	1062.2	-428.5	25	NO	40	NO
SO_2	240.70	262.70	-22.0	40	NO	N/A	N/A
VOC	123.40	87.3	36.10	N/A	N/A	40	NO
TSP	376.1	706.40	-323.3	N/A	N/A	25	NO
PM_{10}	314.0	508.89	191.8	15	NO	N/A	N/A
$PM_{2.5}$	272	390.0	-115.1	N/A	N/A	10	NO
CO	1192.48	1203.8	-11.3	100	NO	N/A	N/A
Lead	0.012	0.012	0.00	0.6	NO	N/A	N/A
H_2S	148.291	277.289	-129.0	10	NO	N/A	N/A
TRS	307.30	297.38	9.92	10	NO	N/A	N/A

EMISSIONS SUMMARY (for C-Battery):

POLLUTANT	Tons/year
Particulate Matter	376.10
PM-10	275.5
PM-2.5	233.50
Sulfur Oxides	262.6
Nitrogen Oxides	633.60
Volatile Organic Compounds	123.40
Carbon Monoxide	1192.50
Benzene	4.57
Naphthalene	0.60
Cyanide Compounds	1.69
HCl	22.0

RECOMMENDATION:

All applicable Federal, State and County regulations have been addressed in the permit. The installation permit amendment for U.S Steel- Clairton should be approved with the emission limitations, terms and conditions in Installation Permit 0052-I011a

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